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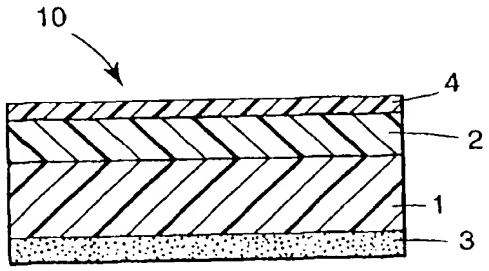

(57) Abstract

A masking tape for painting comprising a substrate and a pressure sensitive adhesive layer, in which the substrate is made of a primary layer comprising a synthetic resin material and at least one auxiliary substrate layer made of a synthetic resin material, which is the same as or different from that of said substrate primary layer, provided on one or both surfaces of said substrate.

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MASKING TAPES FOR PAINTING

Technical Field Of The Invention

The present invention relates to a masking tape for painting. The masking tape of the present invention can reduce a gap at the boundary between a painted portion and a non-painted portion (sometimes referred to as a "step height at the end of paint coating") when the masking tape is peeled off after the completion of painting, to make the paint line look better. The masking tape can also be easily peeled off without breaking the tape when the temperature of the paint is lowered after painting has been completed. Accordingly, the masking tape of the present invention can be advantageously used in various painting operations.

PRIOR ART

In painting a car body, various masking tapes have been used to temporarily mask the region requiring no painting. The masking tape is normally composed of a substrate and a pressure sensitive adhesive layer provided on its one surface (side of article to be painted). There are many requirements for the substrate of the masking tape. For example, the substrate should have good conformability to articles having different shapes such as curved portions, and cause no adhesive residue and breakage of the tape at the time of peeling. Furthermore, the masking tape should cause no contamination to the article to be painted, and the masking tape should not peel cured paint from the article. Accordingly, papers such as crepe paper, kraft paper, Japanese paper, etc. and films made of synthetic resins such as olefin synthetic resin, vinyl chloride, polyester, nylon, etc. are used at present. The masking tapes using these materials as the substrate have good conformability to the article to be painted, but have a problem that a partial stress concentration is caused by cracking of the cured paint when the masking tape is peeled off from the article to be painted after the paint has cured, resulting in breakage of the tape.

To avoid the problem of tape breakage, increasing the thickness of the tape has been tried to improve the mechanical strength, as has peeling off the masking tape by hand when the paint is still in a high-temperature state immediately after removing the article from a drying device, when the paint film is still soft.

However, increasing the thickness of the tape has been problematic especially when wet-on-wet painting metallic paints and mica paints, which have been introduced to improve the appearance. In this case, a gap between the painted portion and non-painted portion increases and the gap (end of the painted portion) is liable to be damaged while peeling the masking tape. Furthermore, since the thickness of the painted portion increases, good appearance cannot be obtained. According to this method, since the stiffness of the tape is enhanced, the conformability at the curved portion is particularly poor and a small gap is formed between the article to be painted and tape. Therefore, it is impossible to sufficiently mask the non-painted portion.

When peeling the masking tape by hand immediately after removing the article to be painted from the drying device, since the paint film is in the state of considerably high temperature, it is necessary to take safety into consideration so that the operator does not burn himself.

Moreover, if there is a remarkable gap at the end of the resulting paint film, it becomes necessary to fill the gap with a compound or grind the gap so as to reduce it, resulting in an increase in man-hours and an increase in cost. There also arises a problem that a cleaning implement such as a brush can be caught in the gap portion when the article to be painted is cleaned, damaging the painted surface.

Summary Of The Invention

It is desirable to solve the above problems of the prior art and to provide a masking tape for painting, which can reduce a gap at the boundary between a painted portion and a non-painted portion when the masking tape is peeled off after the completion of painting, thereby to make a paint line look better, and which can also be easily peeled off without breaking when the temperature of the paint film is lowered after painting has been completed, or under another low-temperature environment.

The present invention provides a masking tape comprising a substrate and a pressure sensitive adhesive layer, characterized in that said substrate is made of a primary layer of a synthetic resin material and at least one auxiliary substrate layer made of a synthetic resin material, which is the same as or different from that of said primary layer. The at least one auxiliary layer is provided on one or both surfaces of said substrate.

In the masking tape of the present invention, the auxiliary substrate layer may comprise a single layer, or two or more layers. When the auxiliary substrate layer comprises a single layer, the auxiliary substrate layer can be preferably provided on the surface having no adhesive layer. When the auxiliary substrate layer comprises two or more layers, all auxiliary substrate layers may be provided on the surface having no adhesive layer. Alternatively, some of those auxiliary substrate layers may be interposed between the primary layer and the adhesive layer.

The synthetic resin material comprising the auxiliary substrate layer preferably has an elastic modulus less than that of the synthetic material comprising the substrate at 0 to 40°C, and, more preferably, it has an elastic modulus of 1.0×10^5 to 1.0×10^{10} dyn/cm^2 at 10°C. The thickness of the auxiliary substrate layer is preferably from about 1 to 100 μm.

The thickness of the masking tape can vary widely depending on the portion to which the tape is applied, and the purpose, but is normally about 140 μm or less. This masking tape is preferably as thin as possible in view of the finishing effect of the paint line.

Brief Description Of The Drawings

Fig. 1 is a sectional view showing one preferred embodiment of the masking tape of the present invention.

Detailed Description Of The Invention

As described above, the masking tape of the present invention comprises a substrate and a pressure sensitive adhesive layer, and is characterized in that said substrate is made of a primary layer of synthetic resin material and at least one auxiliary substrate layer made of a synthetic resin material, which is the same as or different from that of said substrate primary layer, provided on one or both surfaces of said substrate. The elastic modulus of the auxiliary substrate layer is less than that of the primary layer at the temperature of 0 to 40°C.

Explaining by way of the case where the auxiliary substrate layer comprises a single layer, the masking tape of the present invention preferably comprises a substrate primary layer 1, a pressure sensitive adhesive layer 3 provided on one surface of the

substrate, an auxiliary substrate layer 2 provided on the surface having no adhesive layer, and an optional releasant layer 4 which is further provided on the auxiliary substrate layer. This masking tape 10 may optionally have an additional layer as known in this technical field (not shown). The additional layer may include, for example, an ink layer for coloring or an anchor coat layer for improving the adhesive strength between the respective layers. The respective tape constituent features will be described below with reference to the masking tape shown in this figure.

The substrate primary layer 1 can be made of any suitable synthetic resin material. The synthetic resin material used herein preferably satisfies the following features. Since the shape of the article to be painted varies widely, the conformability to the curved portion should be good. Furthermore, since high-temperature is applied to dry or cure the paint film, the synthetic resin material should have excellent heat resistance and proper mechanical strength, and paint should not penetrate the substrate. Preferred synthetic resin materials include polyolefin resin such as polyester resin, nylon resin, polyvinyl chloride resin, polypropylene or the like, but is not limited thereto.

The thickness of the substrate primary layer 1 is preferably within the range of from about 10 to 120 μm, and more preferably from about 15 to 100 μm. When the thickness of the substrate primary layer 1 is smaller than about 10 μm, since the strength of the substrate is too small, tearing of the masking tape 10 is liable to arise. On the other hand, when the thickness exceeds about 120 μm, the total thickness of the tape becomes about 150 μm or more and various disadvantages are liable to be caused by an increase in gap.

The auxiliary substrate layer 2 can eliminate the need to increase the thickness of the substrate by forming a multi-layer or composite substrate, and can act as a stress buffer layer. That is, by providing this auxiliary substrate layer 2 adjacent to the substrate primary layer 1, it is possible to prevent stress concentration to the substrate, thereby causing breakage of the tape. The auxiliary substrate layer 2 can be made of a synthetic resin material, which is the same as or different from that of the substrate primary layer 1, and can be preferably made of a different synthetic resin to provide a synergistic effect of both materials. The synthetic resin material used herein is preferably soft and is superior in adhesive properties.

The synthetic resin material constituting the auxiliary substrate layer 2 preferably has an elastic modulus of 1.0×10^5 to 1.0×10^{10} dyn/cm^2 at 10°C. When the elastic modulus of the synthetic resin material is smaller than 1.0×10^5 dyn/cm^2, slip of the back surface of the tape becomes poor and operating characteristics of application of the tape are lowered. When the tape is formed into a roll, a soft resin can be squeezed out and the roll side surface may become sticky. To the contrary, when the elastic modulus exceeds 1.0×10^{10} dyn/cm^2, the stress buffer effect is not sufficient and slivering occurs. "Slivering" means breakage of the tape at the time of peeling and, therefore, an "anti-slivering effect" is an effect capable of preventing breakage of the tape.

Synthetic resin materials capable of satisfying the above-described features of the elastic modulus include polyacrylate resin, SBR (styrene-butadiene) resin, NBR (acrylonitrile-butadiene rubber) resin, MBR (methacrylate-butadiene rubber) resin, urethane resin, polyolefin resin or the like, but is not limited thereto. An organic filler such as organic glass beads and an inorganic filler such as pigment for coloring may also be contained in these materials, and these materials can also be crosslinked to improve the solvent resistance.

Moreover, the thickness of the auxiliary substrate layer 2 made of the above-described synthetic resin material is preferably from about 1 to 100 μm. When the thickness of the auxiliary substrate layer 2 is smaller than about 1 μm, the anti-slivering effect may be insufficient. On the other hand, when the thickness exceeds 100 μm, the total thickness of tape becomes about 150 μm or more and various disadvantages are liable to be caused by an increase in gap.

The auxiliary substrate 2 can be provided on the substrate primary layer 1 by using suitable techniques generally used in film forming. Suitable methods include solvent coating; applying a water dispersion by an emulsion polymerization method; thermally melting a resin of 100% solid to form a liquid; and performing extrusion molding, simultaneously, when a synthetic resin material as a substrate are molded into a film by means of extrusion molding; but is not limited thereto.

The pressure sensitive adhesive layer 3, which is provided on one surface of the substrate so as to apply the tape to the article to be painted, can be sufficiently adhered to a steel plate as a typical example of the article to be painted, and can be easily peeled off after the completion of painting. It is preferred, though not required, that the adhesive be

chosen to allow the tape to be removed from the surface to be painted and repositioned several times. Such an adhesive may be referred to as a repositionable adhesive. Moreover, the pressure sensitive adhesive layer can be made of a pressure sensitive adhesive that does not cause contamination of the article to be painted. The pressure sensitive adhesive used herein is not specifically limited, but preferably includes those which are not attacked by the solvent in paint. Suitable examples thereof include acrylic, natural rubber, synthetic rubber and urethane pressure sensitive adhesives.

The pressure sensitive adhesive layer 3 preferably has an adhesive strength within the range from about 100 to 2000 g/25 mm, more preferably from about 200 to 1500 g/25 mm, and most preferably from about 300 to 1000 g/25 mm, like the pressure sensitive adhesive layer of conventional masking tapes. When the adhesive strength of the pressure sensitive adhesive layer 3 is smaller than about 100 g/25 mm, it becomes difficult to strongly apply the masking tape to the article to be painted. When the adhesive strength exceeds about 2000 g/25 mm, the bonding strength of the tape to the article to be painted may be too strong and the tape is more likely to break during removal.

The pressure sensitive adhesive layer 3 can have a thickness within the range from about 4 to 70 μm, and preferably from about 10 to 50 μm, like the pressure sensitive adhesive layer of conventional masking tapes. When the thickness of the pressure sensitive adhesive layer 3 is smaller than about 4 μm, it becomes difficult to obtain the expected adhesive effect. On the other hand, when the thickness is lager than about 70 μm, the bonding strength of the tape to the article to be painted is likely to be too strong and the tape is more likely to break during removal.

The pressure sensitive adhesive layer 3 can be formed in the above-described thickness by using the same manner as that used in the production of a general adhesive tape, for example, knife coating, roll coating method, gravure coating or the like.

The masking tape 10 can have a releasant layer 4 as an outermost layer. The releasant layer 4 allows easily processing the masking tape 10 into a roll, as described above, and optionally can be made of a generally used releasant, for example, urethane releasant, polyethylimine releasant or the like. Accordingly, the releasant used for carrying out the present invention is not specifically limited, but a non-silicone releasant is preferably used.

The releasant layer 4 can have a thickness within the range from about 0.001 to 0.1 μm, and preferably from about 0. 01 to 0.05 μm, like the releasant layer of conventional masking tapes. When the thickness of the releasant layer 4 is smaller than about 0.001 μm, it becomes difficult to obtain the expected release effect and handling of the tape also becomes inconvenient.

The releasant layer 4 can be formed in the above-described thickness by using the same manner as that used in the production of a general adhesive tape, for example, knife coating, roll coating method, gravure coating or the like. The releasant layer 4 need not be applied to the substrate primary layer 1 or auxiliary substrate layer 2. For example, a releasant may be incorporated into the auxiliary substrate layer 2. Alternatively, a releasing function may be imparted to the auxiliary substrate layer 2 itself.

The thickness of the masking tape 10 comprising the substrate primary layer 1, auxiliary substrate layer 2, pressure sensitive adhesive layer 3 and releasant layer 4 can vary widely depending on the portion to which the tape is applied, and the purpose, but is normally about 120 μm or less. When the substrate primary layer 1 is made of a polyester resin, since the thickness of the substrate can be reduced, the thickness of the masking tape 10 is normally within the range from about 15 to 80 μm. The masking tape 10 is preferably as thin as possible in view of the finishing effect of the paint line.

Using the masking tape of the present invention, various paints can be applied to articles having different shapes. For example, there can be used liquid paint containing a predetermined amount of an organic solvent or aqueous solvent, such as acrylic resin paint, urethane resin paint, alkyd resin paint, polyester resin paint, vinyl chloride paint, etc. or powder paint corresponding to these paints.

EXAMPLES

The following examples and comparative examples further illustrate the present invention in detail. In Table 1, materials used as the substrate primary layer of the masking tape in the respective examples are described, together with trade name, product No., maker and thickness thereof. In Table 2, materials used as the auxiliary substrate layer of the masking tape in the respective examples are described, together with trade name, product No., maker, thickness and elastic modulus thereof. The elastic modulus was measured in the following manner: A sample having a thickness of 50 to 100 μm, a

width of 8 mm and a length of 35 mm was made by forming a film on a liner and a dynamic viscoelasticity was measured at 6.28 rad/s by using a measuring device, Viscoelastic Meter RSA-II manufactured by Rheometric Co.

EXAMPLE 1

On one surface of a PET film having a thickness of 25 μm, both surfaces of which were subjected to a corona discharge treatment, manufactured by Unitika Ltd. under the trade name of "EMBLET S," a SBR latex resin having an elastic modulus of 2.2×10^9 dyn/cm^2 manufactured by Nippon Zeon Co., Ltd. under the trade name of "NIPOL" was applied and then dried at 100°C for 3 minutes. On the formed SBR latex resin layer, a urethane releasant was applied in a small thickness, and then dried. On the surface opposite the surface on which the SBR latex of the PET film was applied, a pressure sensitive adhesive obtained by mixing a tackifier resin with a natural rubber in a heptane solvent was applied so that the thickness after drying is 25 μm. The resulting pressure sensitive adhesive sheet was cut into strips 18 mm wide and 30 mm long to make a test tape.

The resulting test tape was evaluated with respect to the slivering, total thickness of the tape (μm), step height at the end of paint coating and flaking according to the following test standards:

Slivering:

Twenty test tapes were applied to a melamine-coated plate and a melamine-coated steel plate manufactured by Nippon Tact Co., Ltd. and sufficiently pressed, and then crosslinking paint used in the car painting line was sprayed. To sufficiently dry paint, the melamine-coated plate was put in a hot oven at 140°C and allowed to stand for 20 minutes. The melamine-coated plate removed from the hot oven was allowed to stand at room temperature for 2 hours, and then the respective test tapes were immediately pulled at a fixed angle (45°) and peeled off. The number of test tapes, wherein breakage of the tape occurred, among twenty test tapes was recorded and this number was taken as "slivering (number of breaks)". In case of this example, slivering was not observed. The smaller the slivering number, the better the results.

Total thickness of tape:

The total thickness of the tape was measured by using a Dial Thickness Gauge manufactured by Mitsutoyo Co., Ltd. In case of this example, the measured value was 55 μm and the results were the same as those of the production condition.

Step height of the paint coating:

In the same manner as that described in the slivering test, one test tape was applied to a melamine-coated plate, and then crosslinking paint was sprayed and dried. Thereafter, the test tape was immediately peeled off. A step height at the end of the paint coating, after peeling off the tape, was measured by touching the step with a finger tip to ascertain whether any irregularities are observed or not. No irregularities, showing sufficiently low step height, were reported as "good;" minor irregularities, showing a low step height, were reported as "fair;" and remarkable irregularities, showing a high step height, were reported as "bad."

Flaking:

The scattering state of cured paint fragments after peeling off the tape was visually judged according to the following criteria:

"Good": 90% or more paint remained on the tape back surface.

"Bad": 90% or less paint remained on the tape back surface.

The results are summarized in Table 3 below.

Examples 2-20

Test tapes were made by repeating Example 1, except the primary substrate and auxiliary substrate were changed as described in Table 1 and Table 2 below.

In the same manner as that described in Example 1, the resulting tapes were evaluated with respect to the same test items. The results are summarized in Table 3 below.

Examples 11 and 12 are examples wherein the substrate has a multi-layer construction. In cases in which the PE layer used in these examples is considered as the auxiliary substrate layer, the thickness of the auxiliary substrate layer is 55 μm in Example 11 or 80 μm in Example 12.

COMPARATIVE EXAMPLES 1-6

A test tape was made by repeating the manner described in Example 1, except the substrate primary layer and auxiliary layer were respectively changed as described in Table 1 and Table 2 below for comparison.

In the same manner as that described in Example 1, the resulting tapes were evaluated with respect to the same test items. The results are summarized in Table 3 below.

TABLE 1

Example No.	Material	Trade Name	Product No.	Maker	Thickness (μm)
Example 1	PET	Emblet	S	Unitika Ltd.	25
Example 2	PET	Emblet	S	Unitika Ltd.	25
Example 3	PET	Emblet	S	Unitika Ltd.	25
Example 4	PET	Emblet	S	Unitika Ltd.	25
Example 5	PET	Emblet	S	Unitika Ltd.	25
Example 6	PET	Emblet	S	Unitika Ltd.	16
Example 7	PET	Emblet	S	Unitika Ltd.	25
Example 8	Unstretched nylon	?	NO	Toray Plastic Film Co., Ltd.	30
Example 9	Unstretched nylon	?	NO	Toray Plastic Film Co., Ltd.	50
Example 10	Unstretched nylon	?	NO	Toray Plastic Film Co., Ltd.	75
Example 11	PET12/PE50 laminate	Emblet		Unitika Ltd.	62
Example 12	PET12/PE50 laminate	Emblet		Unitika Ltd	62
Example 13	PP/PE blend	Emblet	FLJ-384	Sumitomo 3M Co., Ltd.	80
Example 14	PET	Emblet	S	Unitika Ltd.	25
Example 15	PET	Emblet	S	Unitika Ltd.	25
Example 16	PET	Emblet	S	Unitika Ltd.	25
Example 17	PET	Emblet	S	Unitika Ltd.	25
Example 18	PET	Emblet	S	Unitika Ltd.	25
Example 19	PET	Emblet	S	Unitika Ltd.	25
Example 20	PET	Emblet	S	Unitika Ltd.	25
Comp. Example 1	PET	Emblet	S	Unitika Ltd.	25
Comp. Example 2	PET	Emblet	S	Unitika Ltd.	38
Comp. Example 3	PVC		FLH-3622	3M Co.	100
Comp. Example 4	Unstretched nylon	?	NO	Toray Plastic Film Co., Ltd.	30
Comp. Example 5	PET12/PE50 laminate	Emblet		Unitika Ltd.	65
Comp. Example 6	PP/PE blend		FLJ-384	Sumitomo 3M Co., Ltd.	80

TABLE 2

Example No.	Material	Trade Name	Product No.	Maker	Thickness (μm)	Elastic modulus (dyn/cm^2)		
						at 0°C	at 10°C	at 20°C
Example 1	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	5	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 2	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	20	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 3	SBR	Nipol	SX1103	Nippon Zeon Co., Ltd.	5	4.40×10^{9}	9.87×10^{8}	7.84×10^{6}
Example 4	SBR	Nipol	LX435	Nippon Zeon Co., Ltd.	5	7.74×10^{7}	3.25×10^{7}	1.48×10^{7}
Example 5	SBR	Nipol	LX209	Nippon Zeon Co., Ltd.	5	1.57×10^{7}	1.21×10^{7}	1.08×10^{7}
Example 6	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	15	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 7	SBR	Nipol	LX426	Nippon Zeon Co., Ltd.	5	2.86×10^{7}	1.98×10^{7}	1.65×10^{7}
Example 8	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	15	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 9	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	5	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 10	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	5	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 11	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	5	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 12	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	30	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 13	SBR	Nipol	SX1105	Nippon Zeon Co., Ltd.	5	2.64×10^{9}	8.72×10^{8}	3.41×10^{8}
Example 14	Acrylic		AE343	JSR Ltd.	5	4.90×10^{9}	5.16×10^{8}	6.30×10^{7}
Example 15	NBR	Nipol	LX517A	Nippon Zeon Co., Ltd.	5	1.68×10^{6}	2.09×10^{6}	2.86×10^{6}
Example 16	Polyurethane	Ramic LP Fine	R Medium	Toyo Ink. Mfg. Co., Ltd.	5	8.78×10^{8}	4.39×10^{8}	2.45×10^{8}
Example 17	Polyurethane	New LP Super	R Medium	Toyo Ink Mfg. Co., Ltd.	5	2.95×10^{8}	1.81×10^{8}	1.29×10^{8}
Example 18	Polyurethane	Ramister	R Medium	Toyo Ink Mfg. Co., Ltd.	5	2.93×10^{8}	2.19×10^{8}	1.85×10^{8}
Example 19	Polyurethane	Sunprene	UWS-140	Sayno Chemical Industries Ltd.	5	7.02×10^{9}	6.28×10^{9}	5.70×10^{9}
Example 20	EVA	Sumika Flex	S-471	Sumitomo Chemical Industries Co., Ltd.	5	1.45×10^{10}	1.91×10^{9}	2.85×10^{8}
Comp. Example 1	None				-			
Comp. Example 2	None				-			
Comp Example 3	None				-			
Comp. Example 4	None				-			
Comp Example 5	None				-			
Comp. Example 6	None				-			

TABLE 3

Example No.	Silvering (number of tape breaks)	Total thickness of tape (μm)	Step height at the end of paint coating	Flaking
Example 1	0	55	Good	Good
Example 2	0	70	Fair	Good
Example 3	0	55	Good	Good
Example 4	0	55	Fair	Good
Example 5	0	55	Fair	Good
Example 6	1	55	Good	Good
Example 7	0	55	Fair	Good
Example 8	4	70	Bad	Good
Example 9	0	80	Bad	Good
Example 10	0	105	Bad	Good
Example 11	2	92	Bad	Good
Example 12	1	112	Bad	Good
Example 13	4	110	Bad	Good
Example 14	0	55	Good	Good
Example 15	0	55	Good	Good
Example 16	0	55	Good	Good
Example 17	0	55	Good	Good
Example 18	0	55	Good	Good
Example 19	0	55	Good	Good
Example 20	0	55	Good	Good
Comp. Example 1	20	50	Good	Good
Comp. Example 2	15	63	Fair	Good
Comp. Example 3	20	125	Bad	Good
Comp. Example 4	20	55	Fair	Bad
Comp. Example 5	15	90	Bad	Bad
Comp. Example 6	20	105	Bad	Bad

From the results described in Table 3, the following points are considered. First, the masking tape according to the present invention is preferably composed of a substrate primary layer made of a synthetic resin material and an auxiliary substrate layer made of a synthetic resin material having an elastic modulus within the range from of 1.0×10^5 to 3.3×10^9 dyn/cm^2, and preferably has a thickness of 5 to 80 μm. By laminating the above auxiliary substrate layer on the substrate primary layer, the anti-slivering effect could have been exerted without increasing the total thickness of the tape.

As described above, when the masking tape of the present invention is used, it becomes possible to reduce a gap at the boundary between a painted portion and a non-painted portion when the masking tape is peeled off after the completion of painting, thereby to make a paint line look better. It is also possible to easily peel off the masking tape without breaking the tape when the masking tape is peeled off from the article to be painted after the temperature of the paint film is lowered after painting, or under another low-temperature environment.

CLAIMS:

1. A masking tape, comprising a substrate and a pressure sensitive adhesive layer, wherein said substrate comprises a primary layer comprising a synthetic resin material and at least one auxiliary substrate layer comprising a synthetic resin material.

2. The masking tape according to claim 1, wherein the elastic modulus of the synthetic resin material of the auxiliary substrate layer is smaller than that of the substrate at 0 to 40°C.

3. The masking tape according to claim 1 or 2, wherein the synthetic resin material constituting the auxiliary substrate layer has an elastic modulus of 1.0×10^5 to 1.0×10^{10} dyn/cm^2 at 10°C.

4. The masking tape according to any one of claims 1 to 3, wherein the thickness of the auxiliary substrate layer is from 1 to 100 μm.

5. The masking tape according to any of claims 1 to 4, wherein the substrate primary layer comprises a first synthetic resin material, and said auxiliary substrate comprises a second, different synthetic resin material.

6. The masking tape according to any of claims 1 to 5, wherein said auxiliary layer is provided on said substrate opposite said pressure sensitive adhesive layer.

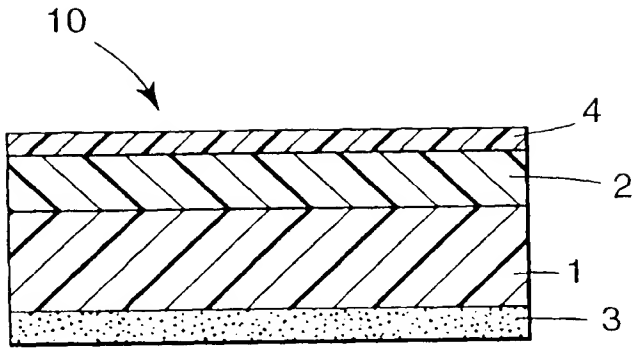

Fig. 1

INTERNATIONAL SEARCH REPORT

tional Application No
PCT/US 99/18956

A CLASSIFICATION OF SUBJECT MATTER
IPC 7 C09J7/02

According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C09J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C DOCUMENTS CONSIDERED TO BE RELEVANT

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A	page 4, line 6 - line 12 page 4, line 22 - line 24 example 3	2,3

X	DATABASE WPI Section Ch, Week 199804 Derwent Publications Ltd., London, GB; Class A17, AN 1998-041658 XP002124977 & WO 97 38059 A (SONY CHEM CORP), 16 October 1997 (1997-10-16)	1,4-6
A	abstract figures	2,3

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex

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Date of the actual completion of the international search	Date of mailing of the international search report
14 December 1999	22/12/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl Fax (+31-70) 340-3016	Schlicke, B

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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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